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| **M & M - Math and Mixture Problems** |
| **About this Lesson** *M & M - Math and Mixture Problems* was written by Nancy Powell, teacher at Bloomington High School, Bloomington (IL).  **Subject: Algebra I Materials Needed:** One box of snack size M&M minis for each student  Optional (virtual) field trip: *the m&m's website* at: <http://m-ms.com/>  http://3.bp.blogspot.com/-gPtATtd3xYg/T_VgpfbC3SI/AAAAAAAADYw/uOdBXlZ0sSc/s400/280px-Plain-M%2526Ms-Pile.jpgThe Mars candy company was getting ready to introduce the blue M&M. In their marketing meeting, they began to explore pricing for its new promotion. If brown M&M's cost $.25 per pound and blue M&M's cost $.85 per pound, how many pounds of brown M&M's must be added to 300 lbs. of blue M&M's to obtain a mixture that would sell for $.45 per pound? Before answering this question, think about these questions and answer them first.   1. If 300 lbs. of brown M&M's were added to the 300 lbs of blue M&M's, how much should each lb. cost? Why? 2. Should the company add more or less than 300 lbs. of brown M&M's to reach their target price per pound? Why? 3. If the company added 600 pounds of brown M&M's to the blue ones, what should the cost of one pound of the mixture be? Why?   Let's take a look at this problem like a tug of war....   * First, draw a rope (a straight line) and label the three numbers that you know. The left end of the rope is the price of the brown M&M's which is $.25. The right end of the rope is the price of the blue M&M's which is $.85. The flag on the rope will be located at the final price of the new brown/blue mixture ($.45). * Draw arrows to show the pulling force in each direction. Since the brown M&M's are pulling harder ($.45 is closer to $.25 than it is to $.85) then make the left arrow longer than the arrow pointing to the right. * Label what you know about the amount of pull each mixture has...the pull to the right is 300 lbs. and let the pull to the left be B since you don't know how many brown M&M's to add. * Calculate the gap between the flag and the left side ($.20) and between the flag and the right side ($.40). Since the gap on the left is half as big, the left side must be pulling twice as hard. Therefore, we must need 600 pounds of brown M&M's to correctly make the mixture. * Notice that the gap times the amount of pull on the left = the gap times the amount of pull on the right (.20)(x) = (.40)(300).   **Let's try another...**  Another mixture is being contemplated by the M&M marketing team. This mixture contains the remaining Valentine's mixture that is 40% red. The marketing team wants to change it to 88% red. If they have 100 pounds of the Valentine mixture and a new batch of red M&M's, how many pounds of the red M&M's must be added to the existing mixture? (Draw a diagram!)  The people that make the dyes to color the M&M's have to mix the colors very carefully so that all of the M&M's match exactly. At the end of one batch of orange dye, the person in charge of making more orange found that she had 50 liters of red dye left. She knows that to make that perfect shade of orange that she will need to have 55% of the final mixture red dye and 45% should be yellow dye. How much yellow dye should she add to the 50 liters of red dye if she is to make the perfect M&M orange?  After Valentine's Day, there were 225 lbs. of a mixture of white and red M&M's found in a store room. This mixture sold for $.55 per pound. The company wants to add blue M&M's for a new mixture for the 4th of July. How many pounds of blue M&M's (at $.85 per pound) should they add to the red/white mixture if they'd like to sell it for $.65 per pound?  Halloween and Thanksgiving are right around the corner. The marketing team wants to develop 10,000 pounds of a special mixture of M&M's that will rival the sale of candy corn. They plan to develop a batch of yellow/orange M&M's with some brown M&M's and sell it at $.53 per pound (since candy corn sells for $.55 per pound). The yellow/orange mixture sells for $.65 per pound and brown M&M's sell for $.25 per pound. How much of each should they put in this special holiday mixture? YOUR TURN with real data... Count the M&M Mini's in your box and record them in the table below...   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Color | Brown | Green | Orange | Blue | Red | Pink | Yellow | Total Number | | number of each color | . | . | . | . | . | . | . | . |  * The M&M Mini's have begun to take the world by storm since the red and yellow M&M's let them out. The addition of pink has made it very popular. Using your box of mini's, fill out the information below.... * # of pink M&M's = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  total # of M&M's = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What percent of the M&M's in your box is pink? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. If you were to make a box of M&M's that was 55% pink, how many pink M&M's would you need to add to the M&M's in your box?   2. What if the new box was to be 75% pink, how many pinks would you have to add?   If the percentages of colors in your box is correct for an entire batch of M&M's, what is the percent of M&M's that are   * + - red in a mixture of red and orange?     - red in a mixture of red and pink?     - red in a mixture of green and blue?   If you took 60 pounds of your red/orange group and added it to the 75 pounds of the extra red/pink group, what would the percent of red be in the new group? *Now, back to more problems....*  If a mixture of yellow/orange M&M's cost $ .65 a pound and a mixture of blue/green M&M's cost $ .78 per pound, how much of each would it take to make a mixture that sells for $ .73 per pound if you want a total of 500 pounds?  The Marketing Department had workers make mixtures of yellow, pink, and green for Spring, but forgot to tell them to use the leftover mixture of green and white from St. Patrick's Day. The Spring mixture (yellow, pink, and green) is 20% green. The St. Patrick's Day mixture is 65 % green. The final mixture for Spring is to be 30% green. How much of the yellow/pink/green mixture should be added to the 10,500 pounds of leftover St. Patrick's Day mixture.  The dye makers are in a bunch of trouble. Instead of making 45 quarts of brown dye that is 30% yellow, they misread the directions and made it 80% yellow. The company won't have this and they don't have enough dye to throw this batch out. They have to FIX it! They need to add more of the red/blue mixture to their "mistake batch." How much should they add to make the new mixture 30% yellow?  The M&M Corporation has been so successful that they need to invest $600,000 in profits. They currently have two bankers on their board of directors and so they must invest some of the money in each of the two banks. Bank A offers an annual interest rate of 4.5% and Bank B offers a 6% interest rate. At the end of the year, the company needs to make $27,900 in interest. How much should they invest in each account to earn this amount of money? Would you recommend that they reconsider their target amount of interest to earn? Why or why not? Now try these....  There is talk of a new product - M&M mini ice cream. If one gallon of ice cream had 9.2% M&M's, how much ice cream containing 2% M&M's should be added to the ice cream to obtain ice cream that is 6.5% M&M's?  My family is going on vacation to the M&M Studios this summer. The total cost of the tickets is $92.50 for 2 adults and 3 children. An adult ticket costs $5 more than a child's ticket. Find the cost of each ticket.  The Blue M&M spent $5.61 on stamps to mail his poetry to his publisher. He bought the same number of 2- and 5-cent stamps and twice that number of 22-cent stamps. How many of each type of stamp did he buy?  An advertisement for M&M's claims that there are 10% of each of the blue, green, and orange M&M's, 20% of each of the yellow and red M&M's, and 30% brown.   * 1. Therefore, in a bag of 345 M&M's, how many of each color should I find in the bag? Assuming that the M&M people did a good job with quality control, there cannot be any broken M&M's in your bag!   2. If your box of mini's did not contain any pink M&M's how many of each color should I have found in your box assuming that the number of mini's in your box remained the same?   3. You've just been hired by the Mars Candy Company in the M&M division. They've just announced that there will be 15 colors of M&M's coming soon!      + Name the colors that you will suggest for the 15 and propose the % of each to manufacture in each batch. Remember that your percents must total 100 %!      + Then, propose two new color combinations of 3 or more colors and the percentage of each color in each of these combinations.      + Finally, use this information to write and solve two mixture problems for the M&M Candy Co.   **Internet Sites with more mixture problems include:**   * + - [21st Century Problem Solving](http://www2.hawaii.edu/suremath/journal.html)     - **Resource in Print** "Tug of War," by William D. Telford, Jr. *Mathematics Teacher*, February, 1993 by the National Council of Teachers of Mathematics |